WHAT IS THE BEST USE(S) AND MISSION(S) OF THE C-27J?

Graduate Research Project

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Abstract

After several years of US Air Force – US Army parochial infighting, the US Congress has awarded the joint cargo aircraft (JCA) to the USAF. The Air Force is slated to receive a total of 38 L-3, Alenia North America C-27J Spartan medium-sized tactical airlift aircraft, down from an initial proposed buy of 145 aircraft with 75 belonging to the Air Force and 70 going to the Army. These 38 Spartans are intended to fulfill the time sensitive/mission critical (TS/MC) direct support to the Army role, despite being operated by exclusively Air Force crews (a similar mission was accomplished during the Vietnam War with the C-7A Caribou). Additionally, the C-27Js will be assigned to six Air National Guard units – the first time in history a new aircraft will enter the USAF inventory and will not belong to a single active duty unit.

This study examined what the best mission set of our C-27J fleet should be, with a special emphasis on the unique role Air National Guard units perform in national humanitarian assistance operations. The research focused on the need to effectively fulfill the TS/MC direct support role, but also looked forward to roles beyond the United States Central Command (CENTCOM) theater of operations, and what the Spartan could offer in a domestic capacity, with our national response to Hurricane Katrina as a salient case study. Additionally, this paper highlights the lucrative intratheater airlift contract currently awarded to Presidential Airways in Afghanistan. Also, it examines how the C-27J could offer the taxpayers a better return on their investment if the Spartan was to pickup all or some of the airlift missions currently being flown by Presidential Airways.

Acknowledgements

I would like to thank several people for their help with this project. Dr. James Moore, Air Force Institute of Technology, was a superb advisor. Thank you to Mr. Gary Upshaw of L-3 Communications, who provided me key information – direct from the manufacturer. Finally, I would like to thank all my brothers and sisters in the tactical airlift business; you guys picked up my slack while I was away studying at AFIT.

Major Craig Moe, USAF

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Chapter 1 – Introduction

"Land forces will operate in smaller, more widely dispersed maneuver units. We should consider how to construct an airlift fleet to better support this concept."

General John Jumper,
(Fulghum, 2004)

"I would like to see an aircraft capable of hauling 1-2 pallets of cargo or up to 30 people around the theater. Such an aircraft would have been useful on the Gulf Coast after Hurricane Katrina."

General T. Michael Moseley
(Butler, 2005)

Background

The nature of warfare has changed dramatically in the last 25 years. During the Cold War, America postured itself for a major theater war with the Soviet Union. American military bases throughout Europe were manned at extremely high levels by soldiers who stood ready for action. The United States Air Force focused its resources on kinetic operations against the Russians. Heavy bombers, air to air fighters and tankers formed the backbone of Strategic Air Command and Tactical Air Command – with the rest of the Air Force struggling to get whatever resources were still available after the Strategic Air Command and Tactical Air Command bills were paid. The Air Force's top officer, the Chief of Staff, was a combat air forces operator. Airlift and re-supply were considered important support activities, but certainly not anywhere near the priority of dropping nuclear weapons or defeating MiGs in dogfighting engagements. Operations such as counter-insurgency or nation building, without a need for strategic bombing or air interdiction, were largely ignored, and left to fill unread pages of post-Vietnam War analyses books.

The world and the Air Force, changed dramatically on 9/11/2001. Suddenly, we were thrust into a war in Afghanistan, against an enemy who did not even have an air force. A few

short years later, we engaged in regime change in Iraq – and once again, easily toppled an overwhelmed military force. Yet, unlike Desert Storm in 1991, where a 100 hour ground war resulted in the expulsion of Iraqi troops from Kuwait and quick redeployment of troops back to America, the US military found themselves in the much slower, messier mission of fighting a counter-insurgency battle. The troops did not go home. In fact, troop levels surged. As then Secretary of State Colin Powell famously remarked to columnist Bob Woodward in 2002, "In Iraq, the Pottery Barn rule applies. If you break it, you buy it." (Woodward, 2004) America essentially owned two diverse, problem-ridden countries: Iraq and Afghanistan. Soon, the enemy employed a devastating new weapon – the improvised exploding device (IED). IEDs made travel by road among the most dangerous of all activities in Iraq, and eventually, in Afghanistan as well. Despite attempts to put IED-resistant armor on American humvees, as well as the introduction of the mine resistant armored vehicle (M-RAP), casualties climbed. Military leadership came to the conclusion that the safest, most effective way to transport and resupply our troops in Iraq and Afghanistan was by air. Subsequently, Air Force leadership identified a shortfall in intra-theater lift capabilities. As Maj. Gen. Marshall K. Sabol, Air Force deputy chief of staff for Air, Space and Information Operations, Plans and Requirements, commented, "We have always been there to support the warfighter. Where this aircraft (C-27J) will fit extremely well is where it will relieve the C-130s usage and provide us the ability to meet the time-sensitive, mission-critical needs to the forward deployed warfighter." (Gettle, 2007) The Department of Defense decided to purchase a medium sized tactical airlifter, the C-27J Spartan. (Gettle, 2007)

After Alenia Aeronautica was awarded the joint cargo aircraft (JCA) contract to build the C-27J, the following questions still remained: which service or services would operate the

aircraft, how many would we buy, and what would the aircraft's mission be? The answers to the first two questions are now known; this paper attempts to answer the third. The proposed buy of the C-27J has seen a number of changes, with the expected number purchased reduced from 145 to 74 to the (new) final total of 38 Spartans. (Krenke, 2009) Initially, the aircraft were to be divided between the Army and the Air Force, but General Norton A. Schwartz, Air Force Chief of Staff and a career mobility/special operations pilot, convinced the Army and Defense Secretary Robert Gates the USAF could effectively perform the critical "last tactical mile" mission. (airforce-magazine.com, 2009) Within the Air Force, the decision was made to make the Air National Guard the exclusive operators of the C-27J; this is the first time a new aircraft has entered the operational inventory and gone directly to the Air Reserve Component without having an active duty operator as well.

Statement of the Problem

Typically, a new aircraft enters operational service with a clearly defined mission and use. The KC-X tanker, for example, will replace the KC-135 and be expected to fly the exact missions currently flown by the Stratotanker. If the new tanker has additional mission capabilities beyond those of the KC-135, it is likely it will pick up additional missions as well. Yet, its core mission will be aerial refueling. The C-27J Spartan is not replacing any like aircraft in the USAF operational inventory. Although, in many ways, it resembles a smaller, twin-engine C-130, it is not being purchased to replace the venerable Hercules. Currently, the C-27Js stated mission is the time sensitive/mission critical (TS/MC) direct support of Army field commanders. However, this researcher is unconvinced that a single mission set will maximize the usefulness of all 38 Spartans throughout their service life. For example, if the US is to see their combat forces in Iraq and Afghanistan greatly reduced within the next ten years, what role will the C-27J then fill?

Additionally, the unique homeland defense role the Air National Guard plays domestically will likely correlate to a US-based mission set for the C-27J.

Research Questions

1. Primary Research Question

What is the best use(s) and mission(s) of the C-27J?

Investigative Questions

a. What exactly will the TS/MC direct support mission entail, in terms of aircraft required and suggested employment procedures?

b. What homeland defense mission(s) is the C-27J uniquely qualified to perform?

c. Are there tactical airlift missions currently being flown in Afghanistan by contractors (Presidential Airways) at a great expense to taxpayers which could be flown by USAF crews with the C-27J more efficiently?

2. Secondary Research Questions

a. How do we remedy conflict between USAF flight regulations and the US Army commanders' desire to successfully accomplish the direct support mission?

b. Does it make sense to have the C-27J exclusively operated by the Air National Guard?

c. Should C-27J crews be trained to fly all the missions the aircraft is capable of performing: paratrooper airdrop, low altitude parachute extraction system (LAPES) drops, search & rescue, and aeromedical evacuation?

Scope

This research focused on an analysis of the technical operating data of the C-27J provided by Alenia North America L-3, the military operating environment in the CENTCOM area of operations, review of Presidential Airways airlift contract in Afghanistan and the unique role the

Air National Guard plays in state-wide, domestic humanitarian assistance operations. A special emphasis is placed on the government reaction to the aftermath of Hurricane Katrina in 2005, and what role the C-27J could have played in an effective relief response.

Sources

This study was conducted by reviewing several periodicals, joint publications, C-27J technical data, OEF mission data and US Congressional testimony. Primary sources of information include, but are not limited to:

- Joint Publication 3-17, "Air Mobility"
- Joint Publication 3-30 "Command and Control for Joint Air Operations"
- C-27J Spartan Alenia Aeronautica Flight Test Data
- Air Mobility Command policy

Organization

Chapter 2 reviews joint air mobility doctrine and the role of the C-27J Spartan. It examines the proposed Concept of Employment (CONEMP) for the Spartan in direct support of the Army role. The chapter closely examines the technical data and operating capabilities of the C-27J. Also, Chapter 2 focuses on Air National Guard doctrine with respect to humanitarian assistance in state emergencies. Finally, this research reviews the Hurricane Katrina after action reports and attempts to synthesize what role the Spartan could have played in relief efforts.

Chapter 3 discusses the methodology used in the research. It outlines the (primarily) qualitative research strategies employed, but also elucidates the quantitative factors which played a role in the research. Chapter 3 lays the framework for the analysis, and gives an explanation of the simple calculations used throughout the work. Finally, it specifies the number of

assumptions and limitations which significantly impacted the quantitative analysis and recommendation.

Chapter 4 provides analysis of the C-130 CONEMP test which occurred in Iraq during the fall of 2009. It examines the cost and utilization rate of Presidential Airways sorties throughout Afghanistan during 2008, and applies a C-27J model to these missions to perform a cost/benefit analysis of using the Spartan to reduce or eliminate Presidential Airways' contract. Finally, it closely scrutinizes a white paper authored by L-3, (clearly a piece of marketing literature) on how the C-27J could have played a key role in Hurricane Katrina relief operations.

Chapter 5 summarizes the analysis, and attempts to tie the research together and ultimately, intelligently answer the research questions.

Chapter 2 – Literature Review

"Amateurs study tactics; professionals study logistics."
General of the Army Omar N. Bradley
(Rieckhoff, 2005)

"Victory is the beautiful, bright colored flower. Transportation is the stem without which it could have never blossomed."
Sir Winston Churchill
(Cohen, 2002)

The C-27J will enter service as a truly purple asset; the Spartan will be operated by the USAF to directly support the US Army. (Schwartz, 2010) Although the first units slated to receive the C-27J, the 179th Airlift Wing in Mansfield, Ohio, and the 175th Wing in Baltimore, Maryland, have yet to receive their Spartans, aircrew from these units began training in early 2010. The 175th and 179th are scheduled to take delivery of their first aircraft in late 2010. (Krenke, 2009) As such, this literature review begins with a review of Joint Publication 3-17, Joint Doctrine and Joint Tactics, Techniques, and Procedures for Air Mobility Operations. JP 3-17 lays the foundation upon which all Air Mobility Command aircraft are employed, not just the C-27J. However, with the Spartan's inherently joint mission, JP 3-17 is arguably the most relevant publication for understanding the guidance given to airlift operators and planners.

As clearly stated on page vii of the Executive Summary, "To deter threats against or assist in the defense or pursuit of US interests, the United States maintains forces, organizations, and processes necessary to conduct and sustain air mobility operations globally, rapidly, and on a scale not matched by any other nation. Rapid global mobility is the timely movement, positioning, and sustainment of military forces and capabilities across the range of military operations." (JP 3-17, 2002: vii) The C-27J promises to play a key role in this national air

mobility effort. Although the Spartan's exact role is yet to be defined (and accordingly, is the focus of this paper), it is clear the C-27J's unique operating characteristics will be used within the intra-theater air mobility realm. JP 3-17 defines intra-theater airlift in the following manner:

> The intra-theater air mobility forces, under the COCOM of designated geographic combatant commanders or operational control (OPCON) or tactical control (TACON) of designated subordinate commanders, provide common-user resources to conduct operations within the theater or joint operations area (JOA). Intra-theater air mobility operations are conducted in response to taskings from a combatant commander or designated subordinate commander and primarily fill theater operational requirements. (JP 3-17, 2003: I-3)

As is addressed in later chapters, the OPCON of C-27J assets within the United States Central Command Area of Responsibility (CENTCOM AOR) is an item which will require a thorough review and memorandum of understanding (MOU) between the USAF and US Army.

The command and control (C2) aspect of air mobility is addressed in great detail in JP 3-17. Other than a few, small organic airlift assets such as the Army's C-23A Sherpas, all DOD fixed-wing mobility aircraft fall under the C2 of the Combined Air Operations Center's Air Mobility Division (AMD). The AMD tasks the expeditionary airlift squadrons via the daily air tasking order (ATO); the squadrons, then, manage their aircrew and aircraft to accomplish the missions. JP 3-17 offers the following guidance:

> Centralized control and decentralized execution of air mobility missions are the keys to effective and efficient air mobility operations. Centralized control allows commanders to focus on those priorities that lead to victory, while decentralized execution fosters initiative, situational responsiveness and tactical flexibility. Although it is not necessary for a single global organization to centrally control all air mobility forces, all commanders should envision air mobility - as a global system capable of simultaneously performing inter-theater and intra-theater missions. (JP 3-17, 2003: III-3)

The joint doctrine, then, appears to favor a centralized AMD managing a theater's airlift assets, but at the same time, provides an avenue for the Army to advocate for control over their

direct support aircraft, including the C-27J. Finally, chapter four of JP 3-17, "Airlift," reviews airlift operations, missions, service organic operations and delivery methods. This chapter, once again, advocates for a single controlling agency for airlift forces, regardless of what service component is receiving the support.

> It is often difficult to view the relative contributions of the components of the joint force in isolation. Each is critical to the success of the joint operation and each has unique capabilities that cannot be duplicated. Common-user airlift achieves an economy of force. Rather than each Service and non-DOD agency providing its own airlift, airlift is consolidated and tasked to support all organizations. While different types of operations will have varying requirements, the following highlights some of the airlift requirements of the various organizations that use common-user airlift. (JP 3-17, 2003: IV-7)

The section then proceeds to outline typical airlift needs for each of the service branches in addition to the special operations community.

Transitioning from a doctrinal to DOD-responsibility perspective, the Quadrennial Roles and Missions Review Report (QDRMRR), published in January 2009, provides clear insight into Secretary Robert Gates' vision for the DOD's responsibility in maintaining the security of our great nation. The report outlines six core mission areas for the DOD: Homeland Defense and Civil Support; Deterrence Operations; Major Combat Operations; Irregular Warfare; Military Support to Stabilization Security, Transition and Reconstruction; and Military Contribution to Cooperative Security. (QDRMRR, 2009: 5-6) Nine core competencies enable successful completion of the core mission areas. (QDRMRR: 6-7) The C-27J Spartan will play a key role in the seventh core competency: logistics. QDRMRR defines logistics as "the ability to project and sustain a logistically-ready joint force through the deliberate sharing of national and multi-national resources to effectively support operations, extend operational reach, and provide joint force commanders the freedom of action necessary to meet mission objectives. (QDRMRR, 2009: 7) Within the subset of logistics, the QDRMRR includes an entire section on airlift, with a

special emphasis on the employment of the C-27J. Of special note is the distinction between general support and direct support airlift. General support is defined as "support which is given to the supported force as a whole and not to any particular subdivision thereof (typically between port of debarkation to point of need)" whereas direct support is "a mission requiring a force to support another specific force and authorizing it to answer directly to the supported force's request for assistance (typically, anywhere between port of debarkation and point of effect)." (QDRMRR, 2009: 20) Figure 1 graphically depicts the relationship between general support and direct support aircraft with respect to a port of debarkation and the point of effect.

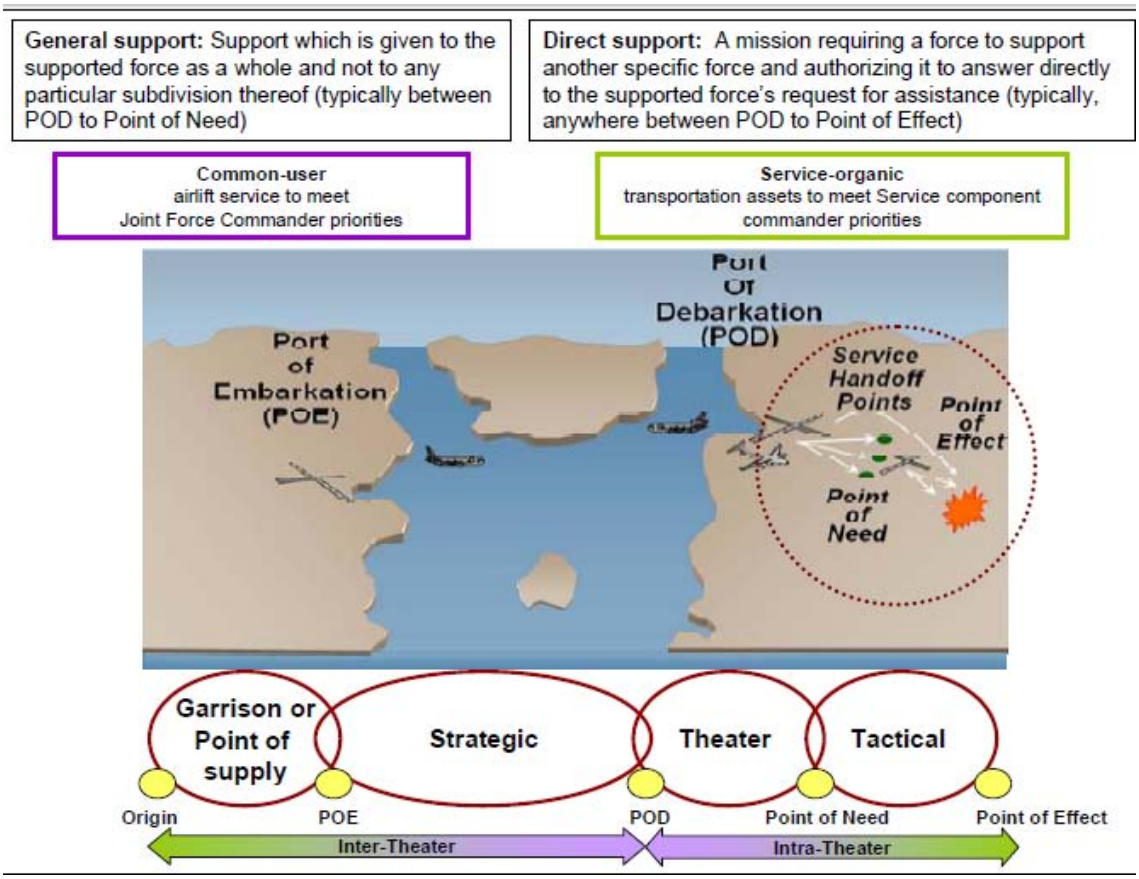

Figure 1: General Support and Direct Support Airlift

The QDRMRR also reviewed key issues regarding airlift in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF). A key observation will directly impact the future employment of the C-27J, namely:

> Increasing distances in a more dispersed and non-contiguous operation environment challenge our ability to supply distributed forces. While this evolving operational environment challenges the capabilities of helicopters to provide direct support to ground forces, the need for direct support remains unchanged. As a result, the Department has determined it must look for new ways to employ time sensitive/ mission critical airlift in theater. (QDRMRR, 2009: 21)

This observation lays the foundation for the acquisition and employment of a medium-sized tactical airlift aircraft. Furthermore, the QDRMRR continues to outline the Secretary's vision for future intra-theater airlift operations.

> The Air Force, through a common-user airlift service, will provide intra-theater general support, while each Service will provide its own direct support using their organic transportation assets. This evolving operation environment, characterized by increasingly distributed operations and longer lines of communication, requires a suitable fixed-wing aircraft for intra-theater airlift roles traditionally filled by helicopters. Mission-capable fixed-wing aircraft in a direct support role will complement other airlift assets and allow the entire intra-theater airlift fleet to be employed more efficiently. … Some fixed wing direct support aircraft, like the C-23B Sherpa, have limited payload and range and cannot support common-user airlift operations theater-wide. The C-27J, which is replacing the C-23B, has significantly greater capability and will be employed to maximize the overall utility for the joint force in either role. (QDRMRR, 2009: 21-22)

Transitioning from a joint doctrine perspective, to a Defense Department review and assessment standpoint, this paper now examines Air Force specific airlift doctrine. Air Force Doctrine Document 2-6, *Air Mobility Operations*, 1 March 2006 is the keystone doctrine document for employing airlift, air refueling, and air mobility support elements as an integrated air mobility system. As chapter one clearly states, "Air mobility forces provide joint force commanders (JFCs) with responsive global reach necessary to achieve US national objectives. (AFDD 2-6, 2006: 1) Furthermore, chapter one specifically outlines how rapid global mobility is an inherent Air Force mission – which, once again, provides rationale why the C-27J should remain an exclusively Air Force asset.

> Rapid global mobility, a unique US Air Force core competency, is key to maintaining global presence and a rapid response capability. The synergistic combination of airlift,

> air refueling, and air mobility support assets represents one of the greatest characteristics differentiating the US Air Force from the air arms of other Services and the capabilities of other nations' air forces. Rapid global mobility is the backbone for expeditionary operations. It enables and enhances the rapid application of combat power and plays a crucial role in supporting US national strategies. Collectively, the air mobility force represents a capability unmatched anywhere in the world. (AFDD 2-6, 2006: 1)

The figure below depicts the AFDD 2-6 notional command relationship chart for air mobility operations. This clearly diagrams the Air Force doctrinal principal of centralized control/decentralized execution, as the Joint Air Operations Center (JAOC) executes control over the air mobility division assets – then sends the taskings out to the wings for execution. (AFDD 2-6, 2006: 21)

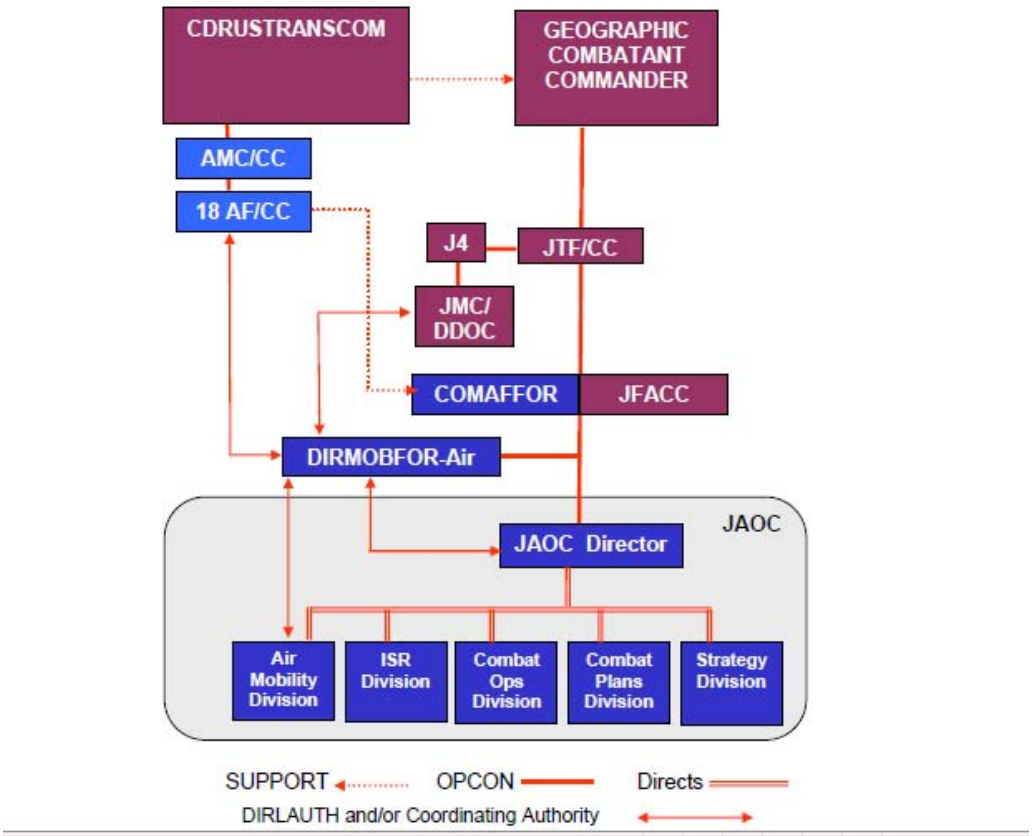

Figure 2. The DIRMOBFOR-Air in the C2 Structure

Moreover, Air Force Doctrine Document 1, Air Force Basic Doctrine, defines centralized control/decentralized execution in the following manner:

> Centralized control and decentralized execution of air and space power are critical to effective employment of air and space power. Indeed, it is the fundamental organizing principal for air and space power, having been proven over decades of experience as the most effective and efficient means of employing air and space power. (AFDD 1, 2003: IX)

Beyond the utilization of a JAOC, the Air Force has established a system of moving personnel and cargo from inter-theater lift to intra-theater lift: the hub and spoke. AFDD 2-6 defines hub and spoke in the following manner:

> Hub and spoke operations integrate both inter-theater and intra-theater airlift operations. Starting from APOEs (aerial port of embarkations), the movement of cargo and personnel progresses through one or more en route staging bases to arrive at a main operations base (the hub) or APOD (aerial port of debarkation) within a theater. The hub is a focal point for follow-on intra-theater airlift missions. Cargo and personnel are processed and readied for transshipment by intra-theater assets to FOBs (forward operating bases) – the spokes, throughout the theater. Hub and spoke optimizes air mobility operations when supporting multiple operational commanders and operations. (AFDD 2-6, 2006: 43)

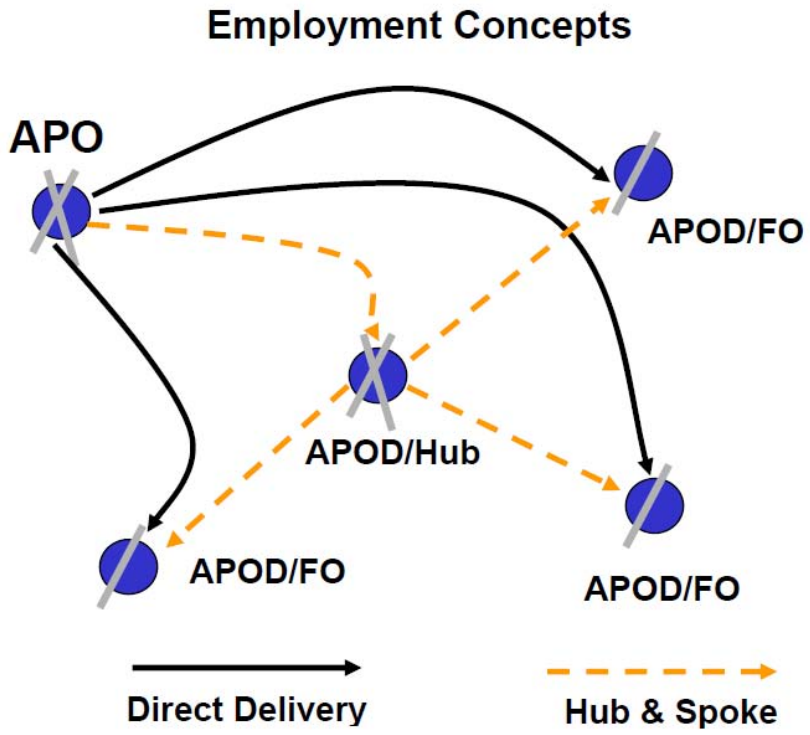

Figure 3. Direct Delivery and Hub & Spoke Employment Concepts.

The use of a single JAOC within a theater, which directs a system of hub and spoke operations, falls squarely within published Air Force and joint doctrine. How, then, does the proposed employment of the C-27J not violate these publications which reflect best practices and lessons learned?

The direct line from doctrine to the Air Force direct support of the Army via C-27J employment is not completely clear. Both AFDD 2-6 and JP 3-17 seemingly make the case for the Spartan to fall under the operational control (OPCON) and tactical control (TACON) of the JAOC's Air Mobility Division, rather than under the TACON of the Army's Combat Aviation Brigade commander. However, JP 3-17 does provide some guidance on service organic intra-theater airlift – which the C-27J will likely be considered, despite its operation by Air Force crews.

> In theory, almost any aircraft could contribute to the intra-theater effort. In practice, however, the bulk of intra-theater missions are normally done by fixed-wing aircraft provided by the Air Force component, while some limited or specialized missions may be accomplished by fixed- and rotary-wing aircraft provided by other services... Additionally, the Services operate more specialized fixed-wing transports which though not originally acquired to meet a broad range of essential intra-theater airlift missions, are capable of performing parts of it quite effectively.
> (JP 3-17, 2002: IV-6,7)

The purpose of this paper is not to re-write policy – the Secretary of Defense has directed the C-27J will be operated by Air Force crews to perform time sensitive/mission critical direct support to the Army commander. (Krenke, 2009) As such, a re-write of AFDD 2-6 and JP 3-17, or an amendment, at a minimum, will likely be required to address the unique doctrinal modifications required to both fulfill the Secretary's direction and remain in compliance with published joint and service doctrine.

The C-27J Spartan's direct support mission, operating under the TACON of the Army, is not without precedent in the Air Force's history. During the Vietnam War, six squadrons of C-7A Caribou twin-engine reciprocating aircraft were employed outside the centralized scheduling system. As outlined in Carl Berger's seminal *The United States Air Force in Southeast Asia, 1961-1973,*

> By 1966 the force had expanded to six companies and operated under the scheduling and mission control of specified Army corps and divisions. In April 1966 the Army and Air Force chiefs of staff agreed to transfer the Caribous to the Air Force. Later that year, USAF air and ground crewman entered Army companies as trainees and replacements. On 1 January 1967 the six companies officially became Air Force squadrons, based at three locations and assigned to the 483d Tactical Airlift Wing at Cam Ranh Bay. For the most part, the squadrons continued to operate under Army scheduling. The Air Force acquiesced in this "dedicated user" procedure, although it was a departure from its doctrine of centralized control. (Berger, 1984: 171)

Berger's book provides little analysis of how effectively the "dedicated user" framework actually worked – other than to provide statistics on how many C-7As were destroyed in the Vietnam War (20). Despite the lack of hard data or quantitative information, Berger provides a piece of analysis which likely could be directly applied to the environment in Afghanistan and Iraq – and gives insight into how the C-27J will be employed and operated by its crews and maintainers.

> For most airlifters, flight operations in Southeast Asia were an abrupt change from the methods taught and practiced in the United States. In peacetime flying, crews adhered to written regulations, regularly attended flying safety meetings, and practiced endlessly the mechanical techniques of instrument flight. In Southeast Asia, however crewmen quickly learned to rely on their own wit and judgment. Prescribed criteria of ceiling and visibility were generally overlooked. Crews flew visually whenever possible, looked for breaks in overcasts, and stayed underneath low ceilings, except when over hostile areas. Squadron commanders frequently had to curb the enthusiasm of their crews and caution them against unnecessary risks – a difficult message in view of the heady sense of mission accomplishment they generally felt. (Berger, 1984: 185)

The lessons learned in the Vietnam War, along with published doctrine and several negotiation sessions between the respective Air Force and Army staffs, each led by their vice

service chiefs, have resulted in the publication of the *USAF Direct Support of USA Time Sensitive/Mission Critical Concept of Employment*, effective 13 Sep 09 per memorandum of agreement signed by the Vice Chief of Staff of the Army and Vice Chief of Staff of the Air Force. Although this document clearly states on page 6 that it is "platform neutral," it takes a very small step to determine it was written primarily as guidance for the employment of the C-27J Spartan. (CONEMP, 2009: 6)

The CONEMP begins by clearly defining what "time sensitive/mission critical movements" mean to respective commanders.

> Time sensitive/mission critical (TS/MC) reflects the Army commander's immediate priorities for delivery of equipment, supplies, and personnel with airlift capacity to be responsive to his/her immediate operational or tactical priorities. No specific time-frame is identified for these TS/MC movements except that dedicated airlift capacity must be available and responsive to fulfill TS/MC taskings. Accordingly, the Department of Defense concluded that TS/MC requirements cannot be routinely satisfied through a common-user airlift service that seeks to efficiently conduct airlift operations throughout the theater to meet the joint force commander's priorities. (CONEMP, 2009: 4)

This concept of TS/MC movement, then, is not driven by a timeline, but rather, availability of aircraft. Also, the CONEMP addresses the unique battle space environment in Afghanistan and Iraq – large areas of terrain, mountainous regions, widely distributed combat troops. Currently, no aircraft in the Army inventory can efficiently perform the TS/MC movement mission. The CONEMP addresses this problem in great detail.

> The CH-47 helicopter is the platform that is doing most of the delivery of mission critical, time sensitive cargo and key personnel today. The CH-47 is being tasked to perform this mission because it is the "best available" Army-owned asset that can be tasked to do the mission. Unfortunately, it is a very expensive and inefficient method of doing the mission. The long distances being covered from the intermediate staging base to the forward units is causing the tasked helicopters to accumulate flight hours well in excess of the planned mission profiles. Additionally, the CH-47 aircraft have primary mission functions they have to perform for the ground combat units. Diverting CH-47 assets from their primary missions creates an adverse operational impact to the ground force command by taking away a highly flexible transportation

asset. (CONEMP, 2009: 7)

Without question, the decision to exclusively place the C-27J in the Air Force's operational inventory, directly supporting the Army, was a compromise that did not completely satisfy either service. The Army sought to operate the Spartan themselves – the Air Force wanted the C-27J crewed and controlled like the C-130 Hercules: through the CAOC's Air Mobility Division processes and direction. Yet, the CONEMP clearly defines how the TS/MC movement mission – not necessarily C-27J specific – will be controlled and executed.

> Combatant Commander (CCDR) should delegate TACON of specific Air Force forces for the TS/MC mission to the COMARFOR (Commander Army Forces) who will exercise TACON of those assets through the designated senior Army aviation authority. The JFC determines air capabilities/forces made available for the Army's TS/MC requirement (in consultation with component commanders). TS/MC airlift represents a small portion of overall Army demand for intra-theater airlift, therefore, most USAF airlift platforms will remain in the common user pool under control of the Combined Forces Air Component Commander (CFACC), while a smaller portion will be TACON to the COMARFOR to transport Army TS/MC cargo and personnel to forward-deployed ground Forces, often in remote and austere locations. (CONEMP, 2009: 8-9)

As previously discussed, Air Force units have not been aligned to directly support Army movement requirements since the Vietnam War and the transfer of the C-7A Caribous from the Army to the Air Force. In the fall of 2009, a joint Air Force – Army test was conducted in Iraq, where Air Force C-130 crews were placed under the TACON of an Army combat aviation brigade commander. The results and lessons learned from that operational test are discussed later in this paper. As figure 4 depicts, the TS/MC CONEMP places an Air Force aviation unit under TACON of the Army. This unit is responsible for planning, execution and monitoring the validated and prioritized Air Mission Requests (AMRs) received from the senior Army aviation authority (SAAA). Liaison officers at the combat aviation brigade (CAB) and the AMD will work together to minimize unfilled AMRs. (CONEMP, 2009: 10)

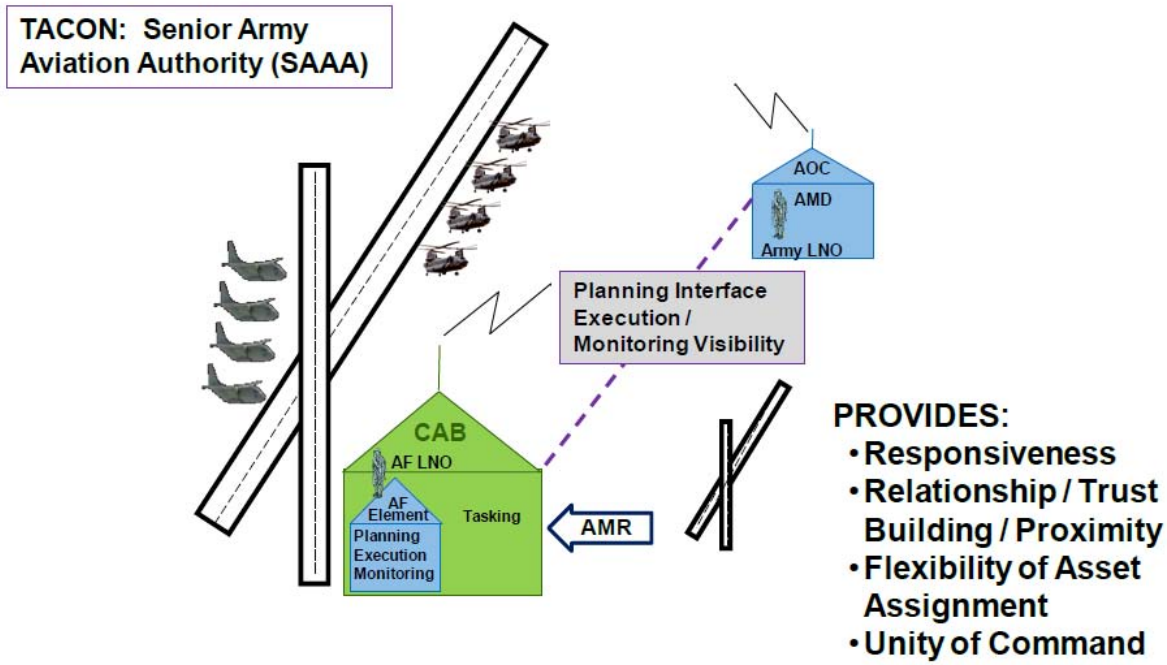

Figure 4. Basic TACON relationship.

Another key area which the CONEMP addresses is the discrepancies between Air Force and Army regulations with regards to issues such as crew rest, weather minimums, fuel required, airfield lighting, etc. The CONEMP makes recommendations on which service-specific guidance item should be followed, in the event of a conflict. Yet, it is important to note the actual decision is left to the combatant commander (CCDR).

> This (section) recommends standard operating procedures and policy for USAF aircrews providing direct support of Army TS/MC requirements. Operational guidance recommendations for TS/MC missions provided below are the result of extensive coordination between the services. Ultimately, CCDR will determine how this CONEMP will be implemented and may supplement the CONEMP with an appendix (i.e. NORTHCOM and Defense Support to Civil Authorities). (CONEMP, 2009: 18)

In order to effectively answer the fundamental question of this paper: "*what is the best use(s) and mission(s) of the C-27J?*", it is imperative the performance characteristics of the aircraft itself are carefully examined. Simply put, the C-27J Spartan is a downsized C-130J Super Hercules, with virtually the same off-the-shelf capability, only on a smaller scale. The

figure below outlines some basic features of the C-27J – more focused figures/graphics provide amplifying data throughout the remainder of this chapter.

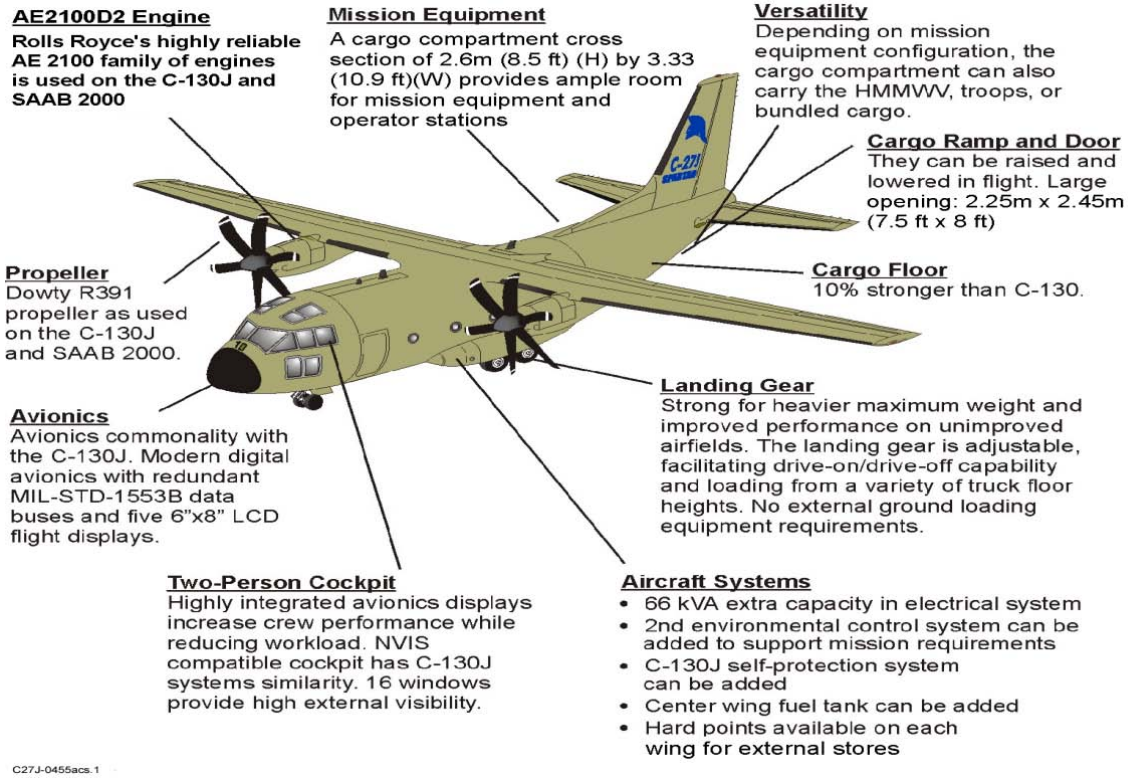

Figure 5. The C-27J Spartan.

The C-27J is built by a "combined team" of L-3 Communications, Alenia Aeronautica (Italy), Honeywell, and Rolls-Royce. The aircraft is designed to take off with a ground run of 1,903 feet at maximum takeoff weight, cruise at 315 knots true air speed at an altitude of 30,000 feet, and have a landing roll at maximum landing weight of 1,115 feet. (C-27J, 2009: 11). The aircraft can carry a maximum cargo load of 25,353 lbs; 36 medical litters with six attendants; 68 troops plus two loadmasters; or 46 paratroops with two loadmasters. The Spartan is also designed (with applicable modifications) to perform search and rescue missions, electronic surveillance, fire fighting and VIP transport. (C-27J, 2009: 6)

The C-27J is equipped with a full defensive systems suite. Key capabilities/components include a radar warning receiver, a missile approach warning system, laser warning receiver and a chaff and flare dispensing system. Additionally, the Spartan is designed to employ directed infrared countermeasures as well as electronic countermeasures of towed decoy (if the purchaser selects these capabilities.) (C-27J, 2009: 10)

A study by the European Airlift Center determined that 75% of military transport flights are performed with less than 10 tons of cargo or less than 50 troops. The Australian Army found that in relief operations in East Timor, the average load was three tons. Relief operations in the US Gulf Coast following Hurricane Katrina rarely filled a C-130's cargo compartment to capacity. (Alenia, 2009: 5) As a result, the smaller size of the C-27J, depicted below, can perform the vast majority of tactical airlift sorties conducted throughout the full range of operations.

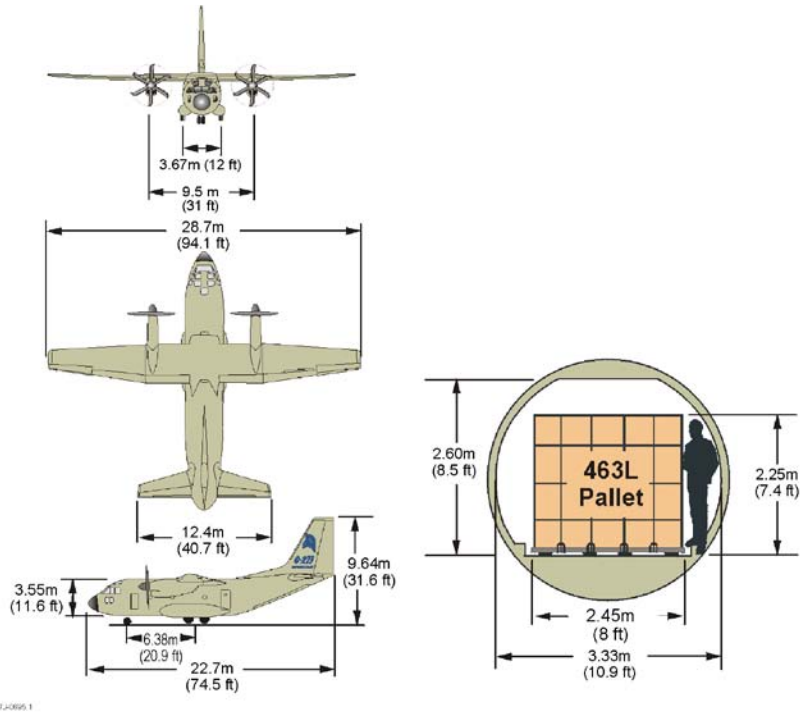

Figure 6. C-27J Basic Dimensions

Homeland defense missions require a high level of aircraft versatility. Often time, basic base operating support equipment such as external power carts and materiel handling equipment are nonexistent or non-operable. In the event of a major hurricane or natural disaster, there is a strong probability the local power grid will be down and airport employees will be unable to make it to their duty locations. An airfield which typically has the full range of aircraft services available will be reduced to a piece of unlit asphalt which is only suitable for aircraft with tactical performance capabilities (landing on night vision goggles, for example) and self-contained electrical ground power systems. In this area, the C-27J is ideally suited for homeland defense operations.

The illustration below, shown in Figure 7, highlights the multifunctional capabilities of the C-27J. As depicted, the Spartan can be configured to support the entire range of tactical airlift mission sets. Most notably, the aircraft can perform essentially all missions the venerable C-130 Hercules has performed for decades. Unlike the C-130, however, the C-27J has reduced minimums for runway required (by 1000' feet), has improved fuel efficiency and demand (by requiring two engines vice four), and utilizes the same state of the art avionics and engines as the C-130J Super Hercules. The design of the C-27J is focused on austere field operations. The electric winch can be utilized from multiple locations within the cargo compartment, which assists in the loading of roll-on/roll-off cargo, such as portable generators or water pump assemblies. The commonality and features of the 463L pallet system ensures the Spartan can easily be cross-loaded from larger aircraft, in the event of hub and spoke operations. Also, the heavy payload capability (25,353 pounds), supports the airlift of two armored humvees, which weigh approximately 12,000 pounds each. (C-27J, 2009: 7)

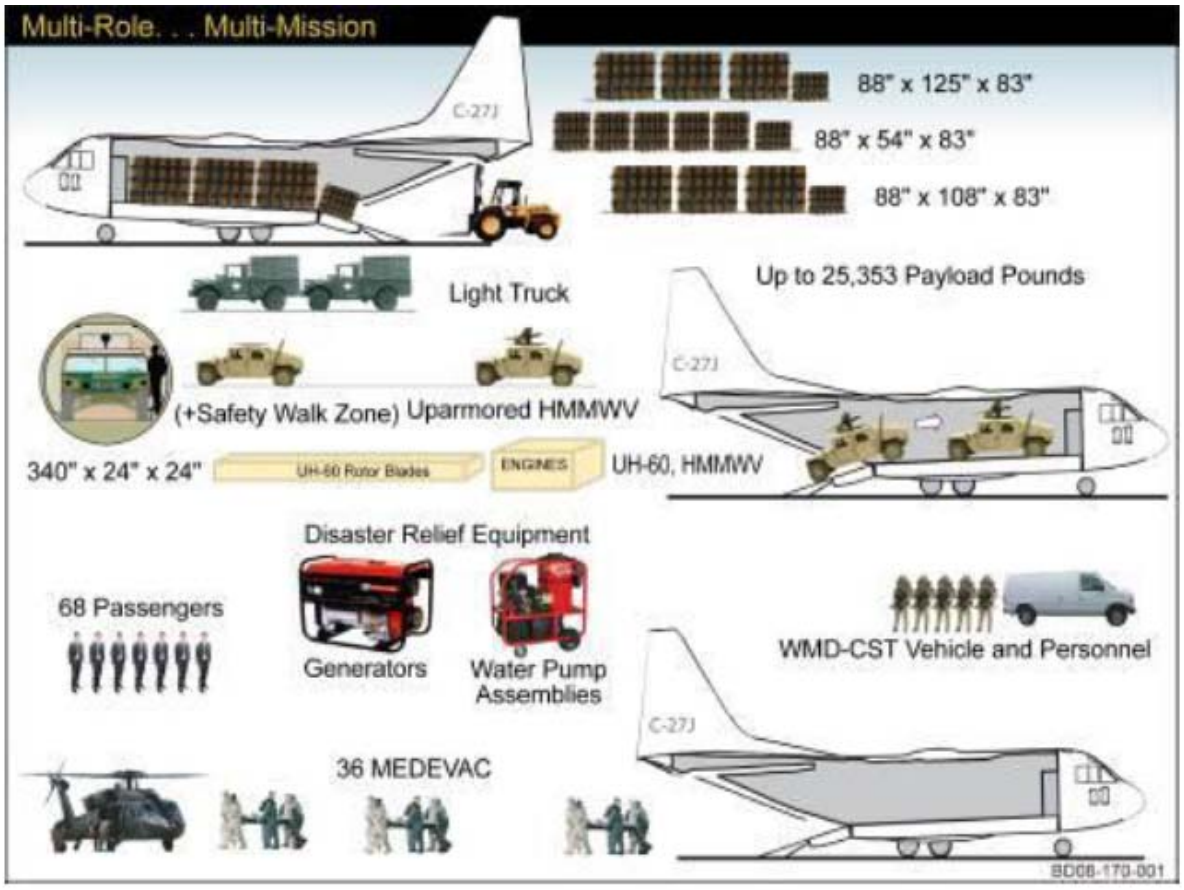

Figure 7. C-27J Multifunctional Capabilities.

One unique design aspect of the C-27J is the variable height loading capability. The Spartan features a unique capability to vary cargo floor height and continuously adjust attitude ensuring easy loading and unloading of large volume, high density payloads without ground support equipment and easy drive in/out of vehicles. This allows response equipment immediate operability. Also, in the event airfield materiel handling equipment such as forklifts are unavailable, the variable height loading capability, used in conjunction with the electric winch, enables the autonomous unloading of nearly all roll-on/roll-off equipment. (C-27J, 2009: 7)

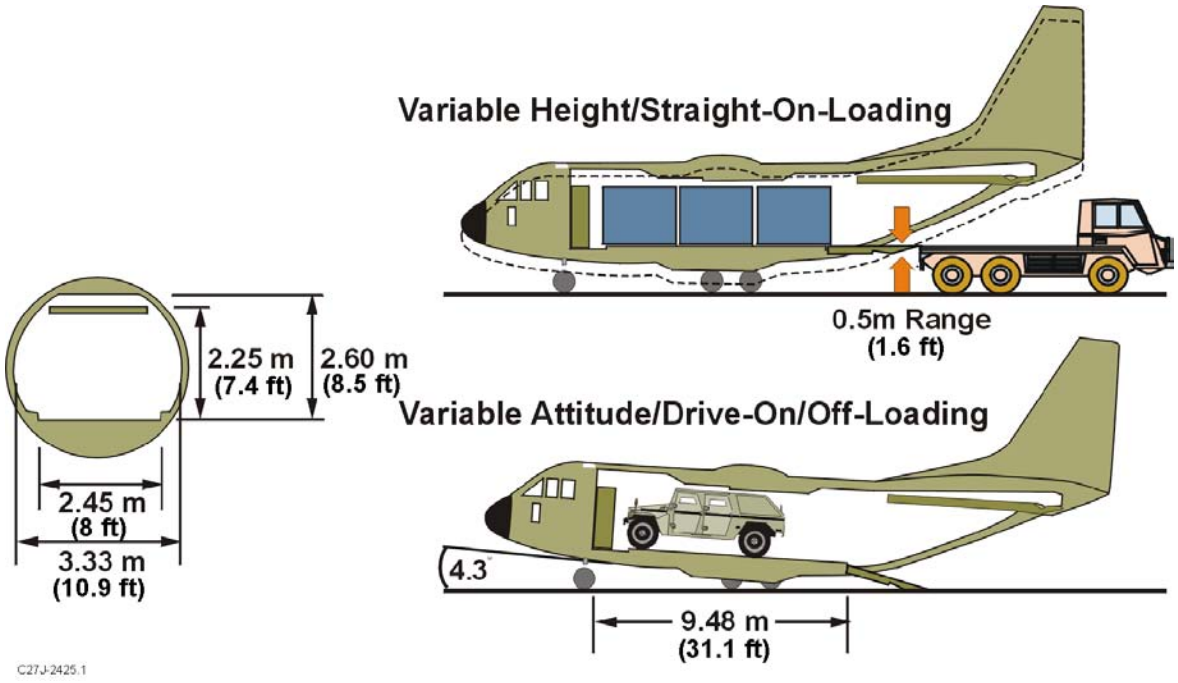

Figure 8. Variable Height Loading.

Figure 9 below quickly highlights the capability of the C-27J in trans-loading scenarios. As previously mentioned, hub and spoke operations are used extensively throughout the CENTCOM AOR. The Spartan is uniquely equipped to receive loads from larger mobility assets, such as the C-17 or C-5, and then airlift the critical supplies the "last tactical mile" to the users in the field. The Spartan uses the 463L pallet system, which ensure standardization throughout the USAF's mobility fleet of aircraft. Additionally, the C-27J's upgraded floor strength enables loading of heavier equipment throughout the cargo compartment at a position most advantageous to the aircraft's weight and balance – unlike limitations which exist in the legacy C-130 Hercules. (C-27J (A), 2009: 6)

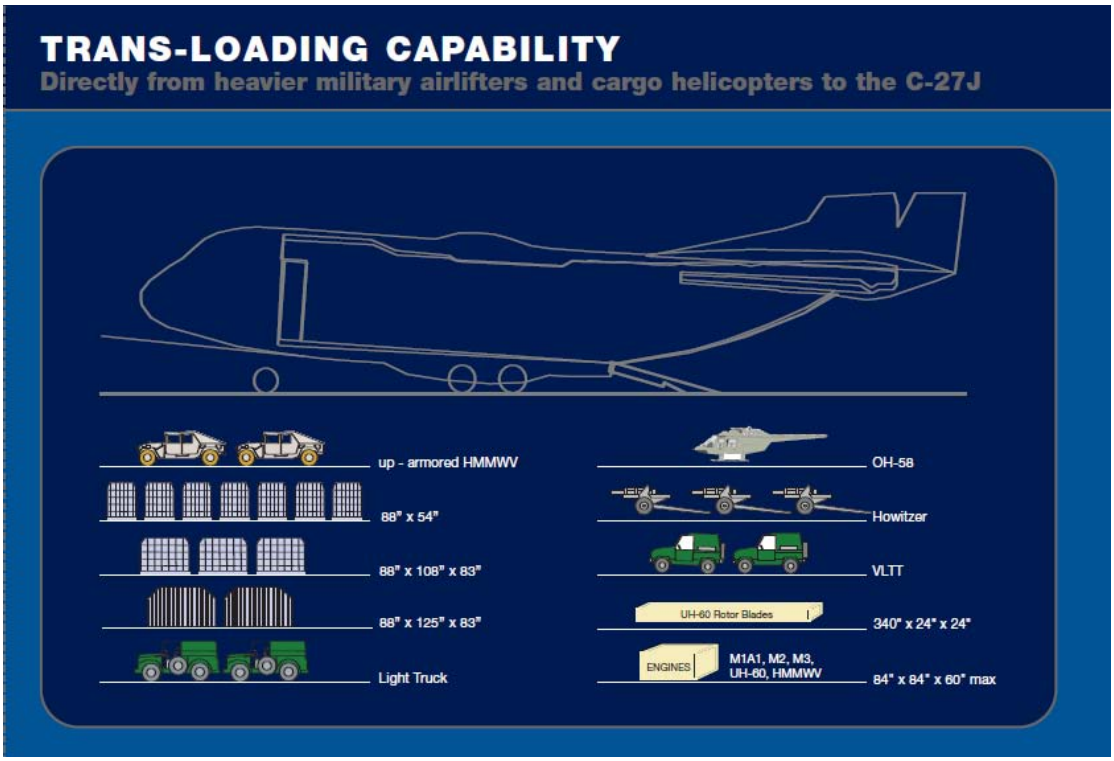

Figure 9. Trans-loading Capability.

In addition to receiving the loads from larger aircraft, the C-27J has the capability to deliver the payload to short, unimproved fields. As Figure 10 depicts, the Spartan, at its near minimum weight, can operate from landing zones with CBR classifications just slightly above the requirements to drive a Jeep (2+). The capability to use fields comprised of loose, dry sand, with only 2000' required, equates to an aircraft of unmatched versatility and survivability. Figure 11 shows the range and payload of the Spartan. Of note, the C-27J can deliver a 5,000 pound payload nearly 2500 miles, land on a dirt strip of 2100 feet, download the supplies without ground support and then take off again (without refueling) while defending itself against both radar and IR threats with a three man crew. (C-27J (A), 2009: 8)

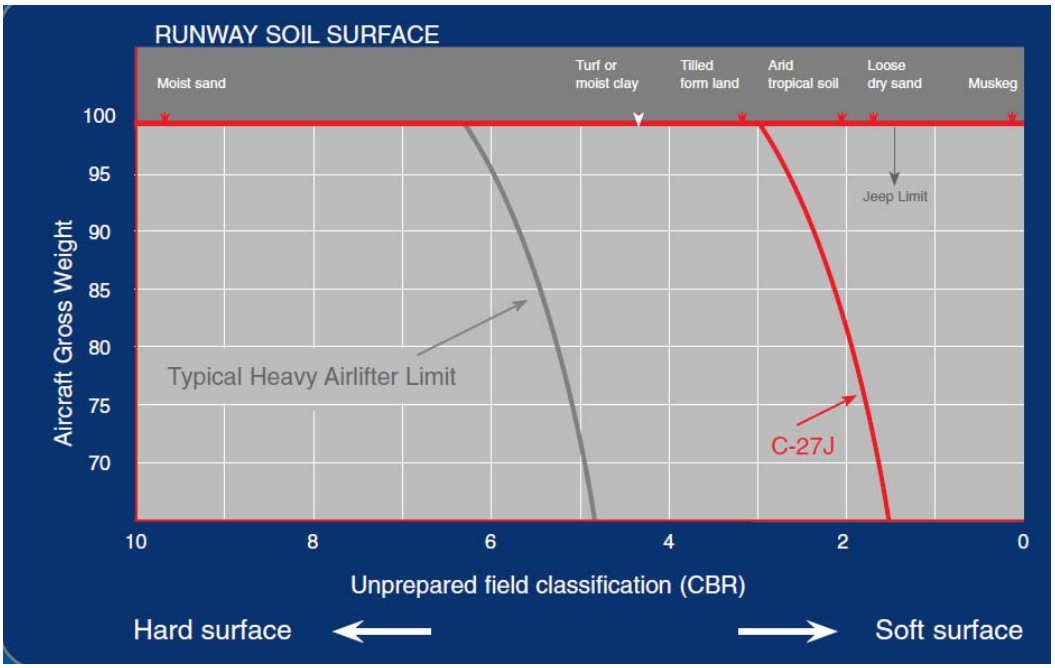

Figure 10. Unimproved Field Capabilities

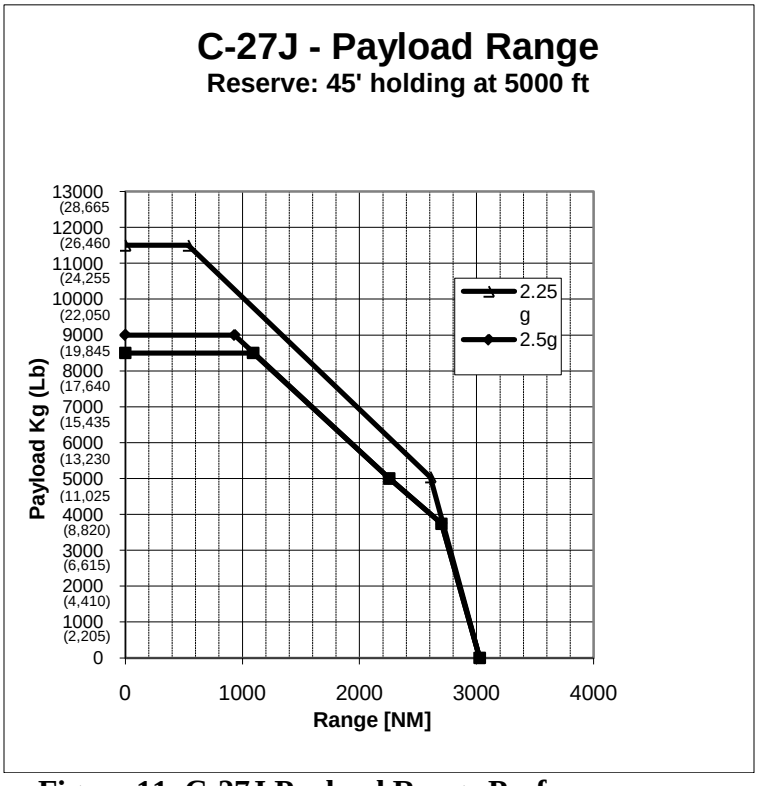

Figure 11. C-27J Payload Range Performance.

C-27J Operational and Performance Features

- Take-off gross weights of 67,241 lbs @ 2.5 g and 70,107 lbs @ 2.25g
- Maximum payload of 25,353 lbs @ 2.25g
- 5.8 PSI differential pressure up to the aircraft's 30,000 ft ceiling
- 440 ft/minute climb rate with one engine out
- 19 minute climb time to 25,000 ft @ 67,241 lbs TOW (2.5g and 3.0g)
- 21,605 lb fuel capacity; and a 2,646 lb center wing fuel tank growth potential
- 180^{o} star-turn capability on 45 ft wide runway
- CBR 2+ field capability
- Up to a 4,000 ft/minute descent rate
- Excellent visibility from the cockpit
- An economic service life of at least 25,000 flight hours

L-3 Communications, knowing the capabilities of the C-27J and also desiring to sell as many as possible to the US Military, wrote a white paper entitled, "C-27J In Support of Disaster Relief." This paper examines the aftermath of Hurricane Katrina, and how the C-27J could have been employed to save lives and reduce suffering.

In August 2005, a Category 5 hurricane developed over the Gulf of Mexico. By August 29th, Hurricane Katrina made landfall in New Orleans, destroying buildings, bridges, water pipelines and the levees that kept New Orleans above the waterline. With the storm bearing down on the Emerald City, nearly 25,000 people made their way to the Super Dome seeking shelter and essential services. Many thousands of New Orleans residents did not make it to the Super Dome, and sought out high ground to evade the rapidly rising waters. Soon after, the Louisiana National Guard put out an "all states" message requesting all guard units to collect and transport sandbags, barriers and weighted shipping containers to be dropped into the broken levee flood areas. (C-27J (B), 2009: 2) A fixed wing distribution center was established in Alexandria, LA, which is 120 miles northwest of New Orleans. Rotary wing support sites were established in Baton Rouge (45 miles northwest) and Hammond (25 miles northwest). The

Army National Guard attempted to deliver supplies via heavy expanded mobility tactical truck (HEMTT), but blocked roads, storm damage and destroyed bridges rendered ground resupply options futile.

In the first days following Katrina's New Orleans landfall, nearly all relief supplies were delivered via rotary wing assets. Unfortunately, the lack of operable airfields, even for aircraft such as the C-130, meant the helicopters had to fly longer sorties to on-load supplies, which meant these assets spent a significantly longer period of time in the air making their round robin flights.

Figure 12. Katrina Relief Flight Distances.

Had the C-27J been operationally employed in 2005, a New Orleans-centric hub and spoke operation (within the greater hub and spoke network) could have been established much closer to the actual disaster area. The New Orleans Sectional Aeronautical Chart shows 13 small civil airports within 30 nautical miles of downtown New Orleans. Clearly, many of these

airfields were without power immediately following the hurricane's landfall, and several were less than 4000 feet and only 75 feet wide. However, the C-27J's unique performance characteristics could have established a Spartan-rotary wing trans-loading location much nearer downtown New Orleans, resulting in a far greater number of people receiving their direly needed supplies. The C-27J could fly 25,000 pounds of relief supplies from a hub 600 nautical miles from the helicopter site, and then return to base without refueling. Given the Air National Guard's state support/disaster relief mission, and assignment of the C-27J exclusively to guard units, it is not a stretch to envision a scenario where the Spartan is used in a hurricane relief type scenario. In fact, L-3 has developed a time and cost comparison for a Hurricane Katrina-type relief operation. This model uses exclusively CH-47 Chinook helicopters to airlift patients from downtown New Orleans to Houston, and then airlift supplies from Alexandria, LA into New Orleans, vice establishing a C-27J staging area at Houma Airfield, which is a 20 minute flight from the Super Dome. In the second scenario, the CH-47s would be used exclusively to shuttle supplies from Houma to downtown New Orleans and return to Houma with patients. (C-27J (B), 2009: 14)

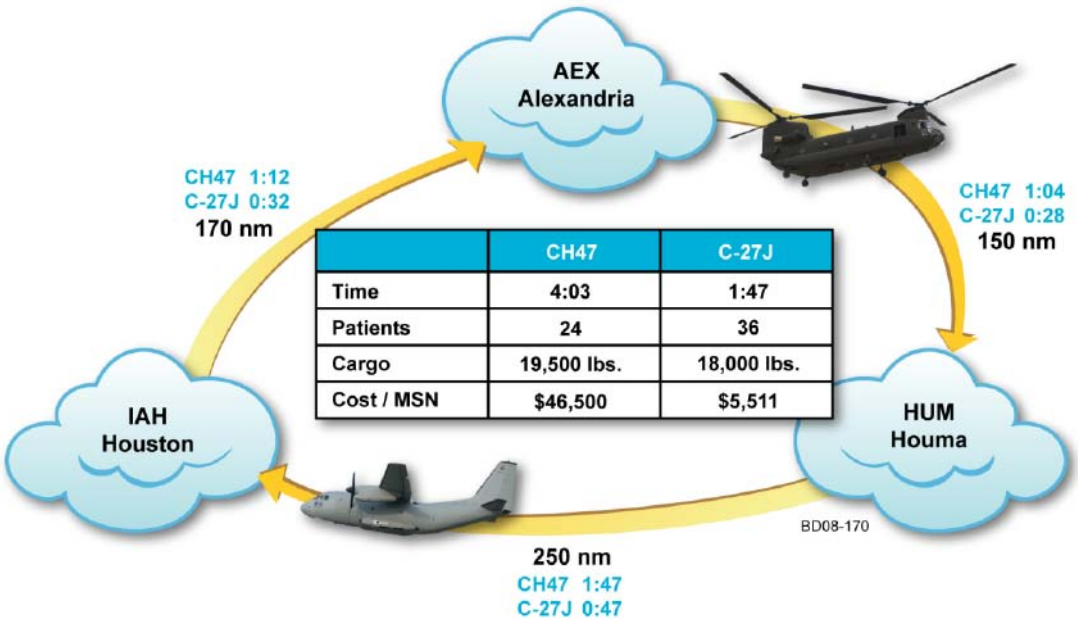

Figure 13. CH-47/C-27J Comparison.

In its "National Defense Authorization Act for Fiscal Year 2010," the US House of Representatives Committee on Armed Services expressed concern with the Department of Defense's decision to assign all 38 C-27J aircraft to the USAF.

> The committee is concerned the Department of Defense has not adequately explained the rationale, nor fully examined the operational impacts, of transferring and consolidating the direct support airlift mission with the Department of the Air Force. The committee recalls the unfortunate history of a similar transfer of C-7 Caribou's direct support mission from the Department of the Army to the Department of the Air Force during the Vietnam War and notes that this transfer resulted in reduced support for Department of Army personnel causing critical missions to remain unfulfilled and endangering lives of troops conducting combat operations. The committee expects that Department of the Army and the Department of the Air Force leadership will execute a detailed agreement concerning the Department of the Army's direct support requirements to be met by the Department of the Air Force, including agreed-upon metrics to determine whether these requirements are being achieved. (H.R. 2647, 2009: 378)

These comments do not offer a strong endorsement of the Air Force's past direct support performance. The committee's comments also indicate the utilization and employment of the C-27J by the USAF will be met with a high level of scrutiny. In that light, it is imperative the Air Force thoroughly examines the capabilities of the C-27J Spartan, the responsibilities of the direct support mission, as well as recommending the proper mission set for the aircraft and its Air National Guard operational units.

Conclusion

The preceding literature review provides the groundwork for this research. Joint doctrine, as well as Air Force doctrine, outlines the proper utilization of the C-27J for intra-theater airlift, as well as its command and control. The CONEMP provides a framework for the direct support mission, which will be the Spartan's primary task. By drawing upon the lessons learned in the Vietnam War during the C-7A Caribou's operation by the Air Force in direct

support of the Army, the researcher hopes to highlight areas in which C-27J employment can be maximized. The C-27J is a highly capable tactical airlift platform, with performance characteristics which enable operations throughout the entire spectrum of intra-theater airlift. Unquestionably, the Spartan would be an asset in nearly any disaster relief effort, especially in scenarios where typical airfield support elements are degraded or nonexistent. Finally, the US Congress has clearly targeted the Air Force's direct support of the Army mission with a critical eye. It is imperative the Air Force effectively perform this direct support mission. The remaining chapters of this study outline the research methodology, data analysis, and conclusions and recommendations.

Chapter 3 – Research Methodology

Research Design

The main goal of this research was to explore the best use(s) and mission(s) of the C-27J Spartan fleet. Specifically, the researcher felt that the direct support mission, albeit the primary role of the C-27J initially, would not effectively utilize the Spartan fleet (currently forecast at 38 aircraft, but quite possibly could grow considerably larger) throughout their forecast service life of 25,000 flight hours. (Additionally, in an era of decreased funding for aircraft systems, it is likely the Spartan will see its service life extended beyond the 25,000 hour forecast, not unlike the C-130E or KC-135). DOD-wide, the spotlight is currently on the Air Force to effectively perform the direct support mission. Yet, with President Obama's plan to begin withdrawing forces from Afghanistan in June 2011, as well as continuing the complete withdrawal of combat forces in Iraq, is it likely that the direct support mission will continue throughout the entire service lives of our C-27Js? Additionally, with the Air National Guard's unique role of statewide disaster relief, should Air Force leadership train C-27J crews to operate in a post-Hurricane Katrina type relief scenario? Finally, as stewards of the taxpayer's money, do we, as a service, have a responsibility to examine the intra-theater airlift operations currently being conducted by private contractors within Afghanistan and Iraq (at a substantial cost premium) and perhaps recommend cutting bloated contracts and performing a percentage of those missions with organic medium lift aircraft such as the C-27J?

The overall research question was "What is the best use(s) and mission(s) of the C-27J?" To answer this question, three investigative questions were examined. A

discussion of these investigative questions and the methodology utilized to answer them follows.

Investigative Question 1:

What exactly will the TS/MC direct support mission entail, in terms of aircraft required and suggested employment procedures?

This question is largely qualitative, but fortunately several sources of information exist which point this researcher toward a cogent recommendation. As examined in the Literature Review of this paper, the "USAF Direct Support of USA Time Sensitive/Mission Critical Mission Concept of Employment" (CONEMP) is directive in nature. Although it was not written specifically for C-27J employment, the Spartan's eventual CENTCOM deployment was the driving factor in the CONEMP's creation. The CONEMP, signed by both the Air Force and Army Vice Chiefs of Staff, became effective on 13 September 2009.

Although the CONEMP was published and signed, both services recognized there were a number of areas which needed to be examined and exercised prior to operational employment of the C-27J (or any other USAF fixed-wing asset, for that matter). In that light, the services conducted an operational CONEMP test from 22 October 2009 to 22 December 2009. This test comprised of two C-130 aircraft, four aircrews and support personnel deploying to Camp Speicher, Iraq, to conduct direct support missions. The 164th Expeditionary Airlift Squadron (EAS) was stood up, comprised of aircrew members from a myriad of units, but under the leadership of an Air Force command package from the 179th Airlift Wing, Mansfield, Ohio. The Mansfield Air National Guard unit, not coincidentally, is one of the first locations slated to receive C-27Js.

As outlined in the CONEMP, the 164th EAS was under the TACON of the Army Combat Aviation Brigade (CAB) Commander. Accordingly, the flight crews received their mission taskings directly from the CAB Commander, bypassing the centralized Combined Air Operations Center Air Mobility Division tasking process. Although the official after action report (AAR) has not yet been published, this researcher conducted interviews with aircrew members and Air Force leadership package individuals to (1) gauge the success of the test; (2) highlight areas that went exceptionally well; and (3) focus on areas of needed improvement.

Investigative Question #2

What homeland defense mission(s) is the C-27J uniquely qualified to perform?

A careful examination of the C-27J performance capabilities was conducted. Without question, the C-27J is a highly capable tactical airlift platform. The Spartan can perform virtually all facets of the direct support mission at an exceedingly high level. Yet, the researcher feels it would be myopic to focus exclusively on the CENTCOM AOR USAF direct support of the USA mission set. During a brief meeting with the new Air Mobility Command Commander in December 2009, the researcher asked General Raymond E. Johns if he saw a mission for the C-27J beyond direct support, to include domestic humanitarian relief operations. The General responded simply, "absolutely." (Johns, 2009) Yet, when the Advanced Studies of Air Mobility class of 2010 met with the Air Force Chief of Staff, General Schwartz on 5 January 2010, the chief made it clear direct support will be the C-27J's primary job. "For years, the USAF avoided direct support. We thought it was heresy. The times have called for direct support. Our CONEMP test went well. We can do this mission without compromising safety. This

proves to our joint teammates we care about their needs. Long held assumptions need to be tested." (Schwartz, 2010)

Looking for further guidance, the researcher reviewed the House of Representatives Armed Services Committee's comments on C-27J employment. Without question, direct support will be the primary employment mission of the Spartan fleet in the immediate future. However, aircraft mission sets tend to grow over time, much as the C-130 was initially employed as an airdrop/airland platform in the Vietnam War, and then saw its mission grow into areas such as close air support, weather reconnaissance, electronic warfare, Arctic resupply, fire fighting, and command & control. It is reasonable to expect a weapon system like the C-27J will see its mission set expand as well.

Additionally, the fact that the C-27J fleet will be operated exclusively by the Air National Guard must also be considered when predicting a future mission set for the Spartan. By examining the performance characteristics of the C-27J, as well as the role of the Air National Guard in domestic disaster relief operations, strong evidence suggests the C-27J will likely see a domestic mission requirement. The aftermath of Hurricane Katrina clearly demonstrated a need for an aircraft which can operate from short, unimproved airfields lacking typical logistical support equipment and infrastructure.

Finally, when looking to other areas in which the Spartan's utilization might expand, it is necessary to evaluate the political climate and the agenda of the Commander in Chief. President Obama has clearly stated his administration's goal of complete combat troop withdrawal from Iraq (in progress as of this paper's submission) and a graduated troop withdrawal from Afghanistan, starting in 2011. (Schlessinger, 2009) In

terms of aircraft age, the C-27J will still be considered almost brand-new in 2012. If the President's strategy is successful, the direct support mission may be dramatically decreased in the coming years.

Investigative Question #3

"*Are there tactical airlift missions currently being flown in Afghanistan by contractors (Presidential Airways) at a great expense to taxpayers which could be flown by USAF crews with C-27J aircraft more efficiently*?"

The researcher began by reviewing the commercial fixed-wing airlift contracts in the OEF theater. Presidential Airways (a subsidiary of Blackwater USA) currently has an extremely lucrative contract to provide short takeoff and landing (STOL) airlift throughout Afghanistan. Presidential operates CASA 212, CASA 235, Metro and Dash 8 aircraft out of Bagram Airfield delivering supplies and personnel.

Table 1. Presidential Airways Contract.

Presidential Airways Fixed Wing OEF Contract				
	CASA 212	CASA 235	METRO	DASH 8
# in OEF	5	2	2	2
fixed monthly cost per aircraft	$245,518	$370,947	$281,770	$364,545
cost per flt hour	$683	$1,470	$683	$1,210
max passengers	19	18	19	30
max cargo (lbs)	3000	7500	4800	7500

Per data supplied by AMC/A9 in Table 1, Presidential Airways currently receives (annually) in excess of $54 million to operate these 11 aircraft. Data in Table 2 is for 2009, current as of September 2009. The 11 Presidential Airways aircraft are utilized (by Air Force standards) at a high rate. Yet, the $54M cost is roughly $5M per aircraft annually – for planes roughly 50% as capable as the C-27J.

Table 2. Presidential 2009 Flight Data (through September).

				PAX	Cargo	Mail	FLT Hours	Fuel	
			Total	26064	2465443	2600492	4130	375716	5065935
2009 STOL	Sorties	873	Sortie Average	38	3583	3931	6	651	
	Mission Type	From	To	Pax Carried	Cargo (pounds)	Mail (pounds)	Flight Time (hours)	Fuel Purchased (Gal)	Leg Remarks
			Total	13872	1235397	124385	1106	168108	1359782
2009 -8	Sorties	1080	Sortie Average	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
	Mission Type	From	To	Pax Carried	Cargo (pounds)	Mail (pounds)	Flight Time (hours)	Fuel Purchased (Gal)	Leg Remarks
2009 235			Total	5167	669562	487349	922.1	127711	1156911
	Sorties	1137	Sortie Average	42	5427	4315	8	1248	
	Mission Type	From	To	Pax Carried	Cargo (pounds)	Mail (pounds)	Flight Time (hours)	Fuel Purchased (Gal)	Leg Remarks

One challenge in this cost-comparison methodology is determining an accurate estimate on the cost of a deployment for a single military unit. Clearly, the DOD still has the responsibility to pay deployed service members, provide for their lodging, food, medical care, transportation to the deployed location, etc. With a civilian contractor, all those costs are incorporated in their operating fees. Yet, $54M annually for 11 (relatively) small aircraft is an exceptionally high price. Per interview with Air Force logistics officer Major Chris Omdal, a rough order of magnitude cost for a deployed 10-ship C-130 package (personnel and equipment) is roughly $1M per month, not counting fuel costs and the relative decreased service lives of the C-130s (as a function of the increased operations tempo under austere conditions.) (Omdal, 2010) Still, it is clear an

organic lift solution could potentially provide a much better return on the taxpayers' dollars.

Based on its performance data, the C-27J Spartan is roughly twice as capable (if not greater) as any of the aircraft Presidential Airways utilizes in Afghanistan. This researcher estimates the costs of a deployed two-ship C-27J package, and compares that value with a 50% reduction in Presidential Airways' contract (both in terms of aircraft and annual cost) to determine if the Spartan provides a better value to the taxpayers.

Limitations and Assumptions

Several factors contributed to various limitations and assumptions associated with this study. The most critical limitation was the unknown number of C-27J aircraft the USAF will deploy at any given time. Additionally, although the current fleet is funded at 38 aircraft, the final total number of Spartans could possibly swing in either direction – with potentially a final number of aircraft 100% greater than the current forecast. Also, American troop levels throughout Afghanistan and Iraq in the coming years are unknown. Perhaps more than any other factor, the deployed troop level will drive the demand for direct support which will drive C-27J employment.

When performing a cost analysis for a deployed weapon system which has never deployed, the researcher had to estimate the number of personnel required to support a two-ship package. Also, the Presidential Airways contract, both in terms of aircraft deployed and cost structure, was assumed to remain constant (2009 values). The researcher assumed the C-27J can operate out of all the airfields the Presidential Airways STOL aircraft utilize throughout Afghanistan.

Finally, the researcher assumed the current plan to assign all C-27J aircraft to Air National Guard units will remain unchanged. Unlike the MC-12, the USAF's most recently acquired and deployed weapon system, the citizen-soldier nature of the Air National Guard will preclude a permanently deployed scenario for C-27J aircrews and aircraft. As such, the likelihood of a domestic Spartan mission is increased dramatically.

Chapter 4 – Analysis

Investigative Question 1:

What exactly will the TS/MC direct support mission entail, in terms of aircraft required and suggested employment procedures?

The CONEMP provides the groundwork for the Air Force direct support of the Army mission. Additionally, the CONEMP test, conducted by the 164th EAS at Camp Speicher, Iraq, from 22 October 2009 to 22 December 2009, highlighted a number of key areas which both this research and Air Mobility Command will need to address. According to the Air Force Deputy Chief of Staff for Operations, Plans and Requirements, Major General Johnny Weida on 4 January 2010, "The CONEMP test was a good run. The Army was very happy. However, we saw inefficient use of the two C-130s, with relatively low utilization rates. If the Air Mobility Division had scheduled the planes, more passengers and cargo, ultimately, would have been moved throughout the theater. Yet, we met the Army's goals in the direct support mission." (Weida, 2010)

From the aircrew perspective, a similar sentiment was echoed. Captain Varun Purohit, a member of the 164th EAS during the test stated, "Our (aircrew) perception was the CONEMP is broken. It merely recreated the Air Mobility Division process at the Combat Aviation Brigade level. There seemed to be an absence of a coherent plan prior to any mission. Typically, we would step to the plane with one plan, and would get re-fragged by the CAB two or three times by the end of the mission." (Purohit, 2010) From a crew management perspective, the 164th EAS would only generate one flight (line) per day – an inefficient use of two aircraft and four crews. On days both aircraft flew, it was considered surge operations. Deployed C-130 squadrons average closer to a

100% aircraft utilization rate, and a 50% crew utilization rate on a daily basis. Additionally, the Army leadership chose to bypass the standard aircrew "bravo alert" system, where a crew is given a period of time (up to 48 hours) they can expect to be alerted for a flight. (Purohit, 2010) If they are alerted, their crew duty day starts one hour after their alert. If they are not alerted, they re-enter crew rest to fly the following day. The Army simply chose to alert each crew as soon as their crew rest was over, and if they did not have a mission for the crew to fly, they were released for the day. In a scenario where the crews required to fly the missions are much closer to the total number of crews available, the Army leadership would need to adopt the Air Force bravo alert system.

Despite the differences in crew management, and the constantly changing mission frag, from a purely operational standpoint, the aircrews reported flying the direct support missions closely mirrored the standard AMD-directed missions they had been flying during previous deployments to the AOR.

With regards to how many C-27J aircraft should or will be deployed at any given time, that decision will be made at the Air Staff level and above. Yet, Maj Gen Weida told this researcher's ASAM class on 4 January 2010, "We expect up to 16 of the 38 C-27Js to be deployed to the theater." (Weida, 2010)

Based on the low utilization rates of the two C-130s during the CONEMP test, as well as the capabilities of the C-27J in terms of payload and passengers, 16 Spartans in theater performing the direct support role would provide a relative excess of that capability. As such, it will be necessary for the Air Force to examine investigative

question #3 and re-consider the distribution of its airlift fleet and its standing contract with Presidential Airways.

Investigative Question #2

What homeland defense mission(s) is the C-27J uniquely qualified to perform?

Without question, the C-27J is a state of the art tactical airlift aircraft, which can operate from short, unimproved, austere fields with minimum to no support infrastructure. As recent history has shown, natural disasters can occur at any time, isolating major population centers from basic necessities and supplies. Often times, ground lines of communication are rendered impassable following hurricanes, earthquakes or floods. As a result, fixed and rotary wing aircraft are the only means by which to move relief supplies from logistical centers to those in need. Hurricane Katrina highlighted the need to get fixed-wing staging areas as close to the disaster zone as possible. In the critical hours and days following a natural disaster, only aircraft which can operate on fields of minimum length and minimum support elements can effectively deliver aid. Based on performance data previously reviewed in this paper, the C-27J performs at the highest level in this area.

Additionally, the President seeks to end the wars in Iraq and Afghanistan as quickly as possible. (Schlessinger, 2009) With greatly reduced troop levels in these two countries, the need for direct support will be, in turn, greatly reduced, if not eliminated altogether. In that case, the Air National Guard, an organization required by law to support the governors of its units' respective states, will own at least 38 aircraft with relatively few flight hours. These C-27J units, then, should train to conduct domestic humanitarian assistance/disaster relief operations. The C-27J Spartan is uniquely

qualified to perform these missions, and will belong to flying units required to respond to domestic emergencies.

Investigative Question #3

Are there tactical airlift missions currently being flown in Afghanistan by contractors (Presidential Airways) at a great expense to taxpayers which could be flown by USAF crews with the C-27J more efficiently?

The data clearly shows the Air Force is paying a premium price for its contract airlift support in Afghanistan. Certainly, Presidential Airways is performing a necessary service for the fees it receives. Additionally, the USAF C-130 fleet is already stretched thinly, out-flying the forecast flight hours on our Hercules fleet (like nearly all of our USAF mobility assets).

Based on General Weida's comments, 16 Spartans would be the maximum deployed to the AOR at any given time. Although the Headquarters Air Force A3/5 is clearly a powerful voice in the discussion on the deployment of any aircraft system, others will give opinions as well. Most notably, the National Guard Bureau will certainly give a recommendation on the number of C-27Js to deploy. Ultimately, the CENTCOM Commander, General David Petraeus will submit a request for forces (RFF) with the desired direct support effects. No player in the decision to deploy the C-27J will operate in a vacuum – it is likely a large amount of cross-talk and dialogue will exist between each agency prior to the formal RFF being submitted. Yet, to deploy 42% of an operational fleet (16 of 38 C-27Js) is a very large percentage. Based on historical USAF aircraft deployment rates, it is likely the final number will be considerably smaller than 16 aircraft deployed.

The old adage "you go to war with the force you have, not the force you wished you had" is certainly applicable in Iraq and Afghanistan. In Afghanistan, ground forces are dispersed throughout a large, mountainous country without reliable infrastructure for power, ground transportation or virtually any other needed service. As a result, airlift is critical for troop transport and resupply. A large number of forward operating bases (FOBs) in Afghanistan have relatively short, unimproved runways which require the use of STOL aircraft. Presidential Airways currently fills a gap in the US Military's airlift fleet – our C-130s, CH-47s and C-23s cannot fulfill all the of the mission requirements. However, as the C-27Js become operational, the organic short-field airlift capability gap will be reduced.

Presidential Airways receives nearly $5 million per year to operate each of its aircraft in Afghanistan. Its least capable aircraft is the CASA 212, which can only take 19 passengers and 3000 pounds of cargo. Yet, those five aircraft cost the taxpayers almost $25 million each year. By comparison, the C-27J can take up to 68 troops, 25,353 pounds of cargo, or a combination thereof. Due to personnel costs, and the fixed costs of any aircraft system, it is difficult to quantify an exact figure for how much the permanent deployment of a two-ship package of C-27Js to Bagram Airfield, Afghanistan would cost the taxpayers. And without question, five CASA 212s can fly more missions to more locations on a daily basis than two C-27Js. Yet, as stewards of the taxpayers' money, the answer to Investigative Question #3 is an unequivocal "yes." As the USAF receives C-27J Spartan aircraft, a small number should be deployed to Afghanistan to minimize the highly expensive contract airlift support required. The equipment and manpower price tag for a two ship C-27J package will be unknown until USAF Spartans become

operational, but it is reasonable to conclude it will be less than the $1M per month for a 10-ship deployed C-130 package.

Chapter 5 – Conclusions and Recommendations

The overall research question analyzed for this study was "What is the best use(s) and mission(s) of the C-27J?" This question led to examination of the political landscape into which the Spartan will enter as well as what level of priority Air Force senior leadership is placing on the direct support mission. It is evident the direct support mission will be job #1 for the C-27J. The eyes of the US Army and the US Congress will be focused on the Air Force's performance of this critical mission. Yet, as our military has seen countless times, mission sets change over time, as a function of politics and operational needs. Further, the unique homeland defense role of the Air National Guard will undoubtedly impact the domestic employment of the C-27J. Finally, as Defense spending continues to gain scrutiny in this period of soaring deficits, it is likely all overseas military support contracts will be closely examined. The Air Force was previously accused by the current Defense Secretary of not being "fully engaged" in the wars in Iraq and Afghanistan. By nearly all standards, $54M to provide 11-aircraft STOL airlift support in Afghanistan is a huge price tag. Employment of the C-27J can ease a significant portion of that financial burden.

Investigative Question 1:

What exactly will the TS/MC direct support mission entail, in terms of aircraft required and suggested employment procedures?

The first part of this question will be directed by the Combatant Commander's RFF, in conjunction with cross-service dialogue. As previously discussed, the Air Force leadership believes the number of Spartan's deployed at any given time will be a

maximum of 16, but the final number is yet to be determined. More pertinent to this study, however, are the employment procedures. The direct support CONEMP, tested in Iraq in October-December 2009, will lay the foundation for this critical mission. As demonstrated in the test, effective crew management will need to be improved. It will be the job of the senior Air Force liaison within the CAB to advocate for proper management and employment of the Air Force C-27J crews. The CONEMP addresses areas where flight regulations between the Air Force and Army differ – those differences will continue to be refined as the direct support mission matures. Also, as mentioned by crew members who participated in the test, the actual flying of the missions had little variation from previous OIF deployments. Aircrews fly into the same fields, hauling the same types of cargo, using the same procedures. Therefore, the greatest change lies in the crew management piece – a piece which undoubtedly will need to be improved.

Investigative Question 2:

What homeland defense mission(s) is the C-27J uniquely qualified to perform?

Based on both aircraft performance capabilities and the Air National Guard domestic response duties, it is clear the C-27J needs to have a defined disaster relief/humanitarian assistance mission set. Using the response to Hurricane Katrina as a benchmark, the C-27J could easily be a key component in any disaster recovery scenario. The AMC Commander, General Johns, agreed with the necessity of giving this mission (in part) to the Spartan. Further, as the C-130 has seen its mission set grow over its operational lifetime, it is likely the C-27J will experience a similar mission growth.

Investigative Question 3:

Are there tactical airlift missions currently being flown in Afghanistan by contractors (Presidential Airways) at a great expense to taxpayers which could be flown by USAF crews with the C-27J more efficiently?

In a word: yes. This study examined the cost of Presidential Airways' STOL fleet of aircraft operating in Afghanistan. These aircraft cost the taypayers roughly $5 million per year per aircraft, for a capability far inferior to what the C-27J would provide. As the C-27J fleet is delivered to the USAF by L-3, this researcher recommends reducing the contract with Presidential Airways (by up to 50%) and maintaining a permanent two-ship package of C-27Js at Bagram Airfield. Discounting the personnel costs for the USAF package, this move could save the Air Force nearly $25 million per year, as well as promoting the Air Force's visibility as "fully engaged" in the Afghanistan fight.

Overall Conclusions and Areas for Future Research

The C-27J will soon be the USAF's newest operational addition to the mobility fleet. Although initially purchased to perform the direct support mission, the Spartan will have the capability to superbly support domestic humanitarian assistance missions as well. As the CONEMP test proved, the Air Force can effectively support the Army – but it needs to refine the process to perform that mission more efficiently. Additionally, as our budget tightens due to the recession and a new administration's focus on domestic priorities, it is essential the Air Force ensure every wartime contract maximizes value to the taxpayers. The C-27J is well suited to perform many of the missions the Presidential Airways STOL aircraft fly in Afghanistan, at a reduced cost to the taxpayer. The following areas for future research should be explored:

1. Does it make operational sense to have the C-27J exclusively operated by the Air National Guard?
2. If the President's timetable for Afghanistan withdrawal changes, what is the right number of C-27Js to deploy for the direct support mission?
3. What tactical mission sets should C-27J crews be trained to perform, to maximize the capabilities of the aircraft but not waste training dollars on missions they will likely never perform?

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14. ABSTRACT

After years of inter-service and Congressional debate, the Secretary of Defense has determined the next medium-sized airlifter, the C-27J Spartan will be exclusively operated by the United States Air Force. The entire planned inventory, 38 aircraft, will belong to the Air National Guard. Although this weapon system is being assigned the direct support to the Army role, this research examines other uses and missions for the tactical airlift platform.

This research utilizes performance data, examines commercial airlift contracts and reviews disaster response scenarios to recommend a wider mission set of the C-27J. After reviewing these sources, the research indicates the C-27J should be utilized for time sensitive/mission critical direct support to the Army, domestic humanitarian assistance, as well as tactical airlift missions currently being flown in Afghanistan by Presidential Airways.

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